UNITED NATIONS

ECONOMIC AND SOCIAL COUNCIL

E/ECA/CM.14/10
18 April 1990
ENGLISH
Original: ENGLISH

ECONOMIC COMMISSION FOR AFRICA

Eleventh Meeting of the Technical Preparatory Committee of the Whole

Tripoli, Libyan Arab Jamahiriya
5 - 11 May 1990

ECONOMIC COMMISSION FOR AFRICA

Twenty-fifth Session of the Commission/ Sixteenth meeting of the Conference of Ministers

Tripoli, Libyan Arab Jamahiriya
12 - 19 May 1990

PRODUCTION, FORESTRY AND PRICE SUPPORT POLICIES FOR FOOD SELF-SUFFICIENCY IN AFRICA

assessment of the food self-sufficiency requirement of the continent must take into account other food items such as roots and tubers, nuts and oil seeds and fruits (which includes plantains). These basic food products constitute 40 to 90 per cent of African population's diet.

Developments in production and trade over the years have combined to worsen the self-sufficiency status of most of Africa's important staple food items.

It is interesting to note, however, that most of the reform programmes presently being imposed on African economies continue to emphasize an important role for international trade, mainly with the developed market economies, to meet the food needs of Africa. Even though the major international financial institutions have now openly acknowledged the unrealistic assumptions surrounding unlimited free trade between Africa and the developed market economies, they continue to hypothesize favourably on the desirability of continued African dependence on food imports to meet its food requirements.

The fact is that many food surplus developed economies fully appreciate the need for managing their own food economy. For example, the recently published long term perspective study on sub-saharan Africa (World Bank 1989), clearly admits that subsidies in North American and Western Europe have created abundant supplies and lowered the prices of cereals and livestock products which have been dumped into African markets thus creating considerable externalities for African agricultural producers. The past and present actions of these developed economies vis-a-vis Africa would suggest that they have traditionally been unwilling and will continue to be unwilling to concede to the need for a global management of the world food economy. This attitude, and the fact that the internal process of adjustment and resource reallocation necessary to capitalize on changing world food conditions are much more difficult for the narrowly based and less diversified African economies than for their rich counterparts in the Northern hemisphere, would suggest that African countries should not expect universal benefits from free trade under existing world trading relations.

Historically food shortages in Africa have been filled by imports from the developed Western World. The FAO has estimated that the aggregate cereal import requirements of sub-Saharan Africa in 1988/89 was 8.8 million tones, mostly wheat and rice. As incomes have increased, rice and, to an increasing extent, wheat for bread have reduced the interest of Africans in traditional grains such as sorghum, millet, and maize as well as their interest in non-grain substitutes such as yams, cassava, and plantains.

Many African governments have found it necessary to encourage the importation of food as a quick and less painful way of meeting

farmers using traditional farming methods with little or no access to modern inputs or equipment. This economic farming community represents in the region of 80 per cent of the total population of the continent if the young population of not yet active individuals, depending on the agricultural sector for its existence, is included. Similarly, the continent's communities of livestock farmers constitute mainly of nomadic pastoralists who have but limited access to modern industrial inputs and animal health facilities; the African fishing communities, likewise, operate as artisans using but few industrial inputs.

About half of Africa's 2878 million hectares (excluding South Africa) is too dry for rainfed agriculture. Only one-fifth of the soils are without any inherent fertility limitation. Drought and floods have struck almost half the countries of Africa during the 1980s. However, in its 1981 report, FAO declared: "Even without using modern farming techniques such as pesticides and with only the most casual approach to maintaining the soil, African countries have the potential to feed a population 4 times as large as that living on the continent, even allowing for the fact that 47 per cent of the land surface is useless for crops".

In sub-Saharan Africa, only 5 million hectares are irrigated (out of which some 70 per cent in three countries: Madagascar, Nigeria and Sudan) against nearly 20 million hectares potentially suitable for irrigation.

According to FAO/ECA studies, pre- and post-harvest food losses due to pests and diseases as well as poor storage and transport can be 30 to 40 per cent depending on the sub-region and food products. Livestock disease such as trypanosomiasis, rinderpest and tickborne diseases are rampant. They can cause calf mortality as high as 30 per cent and limit the use of land resources[1].

Poor infrastructure has hindered the development of new areas, the supply of appropriate inputs and the movement of food production from rural to urban areas, because the growing cities are normally well linked into the international communications system, and because food imports come cheaper, free from political patronage, it is often easier for the urban food supply to be obtained from abroad than from the country side.

As stated by FAO (1986), "the urban biased development strategies of many African countries have failed to supply agriculture with financial and administrative resources or the political support that its central role in the economy would justify

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[1] FAO. African Agriculture: the next 25 years, Rome 1986.

Despite the complementarity of the domestic food crops and export crops sub-sectors, there is one area in which domestic food crops do appear to have been neglected relatively as well as absolutely. This is in research. There has been no counterpart to the "Green Revolution" breakthrough in Asia. There has been a tendency in African agriculture research to concentrate on export crops rather than food produced and consumed locally and by poor people. Both credit and extension have been concentrated on larger farmers despite declared national policies favouring small farmers including women who are responsible for the production of some 70 per cent of the region's food supply. Problems of access to credit are further aggravated in cases where small farmers including women hold their land under customary tenure rules and therefore cannot offer it as collateral. Women farmers are particularly poorly served by extension. Despite the recognition in the Lagos Plan of Action and in UN-PAAERD that women are "vital instruments for solving the food crisis", there is still inadequate attention to tailoring agricultural interventions to the needs of female-headed farming households.

African agriculture may thus be said to be at a stage equivalent to that of the industrialized countries in the very early years of the appropriation of rural activities by industrial capital. Thus hand tools predominate, though these are largely of industrial manufacture and, more often than not, imported; very few farmers do not keep their own seed for resowing; use of chemical inputs is minimal (2.3 kg of chemical fertilizer per hectare[1] in 1986 as compared to 122.7 kg in the industrialized countries) and the major portion of every year's food crops is consumed on the farm where it is grown, often after considerable effort (mainly that of women) has been expended in traditional methods of processing and preparation. Production yields, both per unit of land and per unit of labour, as would be expected, are low and average monetary earnings very low.

There is in progress, alongside an essentially stagnant agriculture in the rural areas, a galloping urbanization in nearly all African countries, while overall population growth rates in the region of 3 per cent per annum are the norm.

It is not surprising therefore that FAO found in 1986[2] that per capita food production in most countries over the last ten years' had risen only slightly or had declined and that the gap between production and requirements, which was very narrow twenty years earlier had widened substantially. As a result there has been a growing tendency to meet demand by imports, particularly of

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[1] Of arable land and permanent crops for Africa excluding South Africa, Egypt, Libya and Sudan.

[2] FAO: African agriculture: the next 25 years, 1986.

in the continent.

A substantial part of Africa's agricultural problem is the result of general neglect of agriculture in general. Agriculture has been given insufficient attention over a long period in the sense of being too little, unevenly distributed and of the wrong kind (FAO, 1986). One particularly serious consequence of this neglect has been the accelerated changes in patterns of consumption in favour of imported food stuffs that is difficult to but must be reversed.

Many governments in Africa have encouraged a greater substitution for wheat and rice than would have occurred through the effects of income and convenience alone. Urban affluence is itself an effect of urban bias, but food policies have further encouraged the shift in tastes by keeping rice and wheat cheap relative to domestically produced grains. To a great extent, this has been due to subsidization of prices of imported wheat and rice both directly and through exchange rates.

In practice, if not in theory, food policies have often been biased against small and female farmers and households.

A change of policy is urgently required if the African objective of attaining food self-sufficiency at continental level based on self reliance is to become a reality. Policy changes could occur in a number of sectors, not just in relation to food imports. Nonetheless, import substitution in the food sector needs to be pursued and vigourous efforts made to ensure self-sufficiency in the African production of the major staple food identified.

Cassava for example is the staple food crop for more than 200 million people in more than 35 African countries and is particularly important during partial and complete crop failure. Biological control of pests and diseases and for conservation is highly needed for this crop which post and harvest losses vary from 30 to 70 per cent depending of the region and the specy. IITA in Ibadan has made a breakthrough in this field and such effort should be pursued vigorously. This analysis also applies to yam and other tubers. (see tables in Annex).

The potential of African fisheries, both marine and continental, is large, with a maximum sustainable yield estimated at 8 million tons a year. The catch has declined from 7.5 million tons in 1977 to 5.8 million tons in 1985. There are urgent needs: (a) to monitor and control foreign fleets in many coastal countries; (b) for fisheries resource management plans that identify fishing potential and the opportunities for exploitation taking into account the long-term conservation and the environment; and (c) for assistance to artisanal fisheries through support to organization of fishermen and women who plays an important role in small scale fisheries and in fish marketing.

The very existence of agriculture and especially food subsector in Africa does not depend just upon its contribution to GDP or to exports. Most importantly, it derives from the fact that the majority of Africa's population live in the rural areas and derive their livelihood directly or indirectly from agriculture. In a very real sense, the efforts and problems of agriculture are the problems of Africa's people.

III. CASE FOR FOOD PRODUCTION SUBSIDY AND PRICE SUPPORT MEASURES

In the world of perfectly competitive markets the theory is incontrovertible that under certain well defined conditions, general equilibrium prices which will result in maximum production and exchange efficiency in all sections of the economy, will be generated automatically. This is the so called state of parieto optimality, in which no-one can be made better off without someone else being made worse off, which is traditionally used to make a case for allowing the market system to operate freely and without government intervention as well as for private entrepreneurship and competition in all areas of economic activity.

There are several reasons why governments in both the developed and developing countries have readily intervened in the markets of their economies despite their knowledge and apparent faith in the benefits derivable from free markets and private competition.

First of all, it is now clear to any objective policy maker but particularly to those who must work in Africa that most markets do not exhibit the ideal characteristics of perfect competition and that the actual benefits of a world of free trade can only be demonstrated in the diorams and models of economists.

Secondly, even from the theoretical angle, it can be shown that any given parieto-optimal equilibrium point depends on the ownership and distribution of factors of production which, in turn, determines the distribution of income and effective demand. In other words, there exists a large number of possible parieto-optimal equilibrium points representing different patterns of distribution of ownership of factors of production and income. Government policy decision in this regard becomes a subjective choice regarding which of the many possible distributions is to be preferred in the face of many conflicting interests, in order to maximize the social welfare of the society.

Thirdly, there is also an overwhelming economic reason why for example, pursuit of domestic food production even at nominal costs which at the prevailing rate of exchange and structure of protection are above those of world market prices, may be a sensible course of action. This is because in many developing countries, particularly in Africa, protection from imports is much

higher for industrial than for agricultural goods, often implying negative real rates of protection for agriculture in general. This situation favours imports of food and discourages production. If this discrimination against agriculture were attenuated, the economic advantages of importing would shift from food towards industrial products, thus favouring domestic food production and increased self-sufficiency.

The final choice of policy is therefore a political one depending on government development objectives. Because different policies will have important trade-offs between efficiency and equity and since there is no objective way of determining the socially optimal allocation of resources for the whole of society, the choice of policy with regards intervention by government in the market, is usually resolved through the political process of each country.

The rational for this intervention is supported by the theory of the second best which states that if for some reason market imperfection exists in one of the factor markets in the economy, it would be impossible to achieve the exchange, production, and output efficiencies necessary for a parieto-optimal market equilibrium or first-best solution. In such a case only a second-best solution can be attained. In fact where competition is distorted in one sector, the optimal second best policy is to introduce countervailing distortions in other sectors. In other words, the theory of second best can be used to argue for the use of government intervention to neutralize the effects of distortions in global markets in the face of changing market circumstances.

(a) Subsidies

In general, subsidies involve consumers of products and inputs paying less than their sellers receive. This often involves a government intervention which results in the owner of a factor of production receiving a different sum from the price paid for the resource by the producers, or a consumer paying a different price for a product than that received by the producer. In the agricultural sector, such a policy intervention is intended to generate and stimulate rapid agricultural production. For example, input subsidies are useful in stimulating the adoption of new techniques of production by allowing early adopters and innovators the opportunity to experiment with input combination alternatives, lowering risk to adopters of fertilizer, raising the profitability of the input to encourage use, direct transfer of resources to the farm level, and avoidance of the time lags in products price policy instruments as income transfer mechanisms. Also, because industrial production of fertilizer exhibits strong economies of scale, the use of subsidies to expand the domestic market can bring forward the development of fertilizer production in a country and lead to more rapid achievement of efficient fertilizer production (Krishna, 1962; Dalrymple, 1984; World Bank, 1986).

Subsidy schemes to stimulate and generate increased agricultural production are not new in Africa. During the colonial period, free seeds and seedlings and generous credit were given to farmers to encourage them to produce export crops destined for the industries of the developed countries (Akinola, 1987). Since the attainment of independence, the development plans of most African countries have called for various forms of subsidies to stimulate development or consumption of some desired product, activity or service, to stimulate development of a particular area, to redress deficiencies in income distribution, to reduce risks of speculative activities, to bring technological change and encourage adoption and the use of inputs on traditional crops in order to boost food production and achieve self-sufficiency or to encourage an activity that yields external economies.

The most traditional use of subsidies in Africa since independence have, however, been directly for or related to the agricultural sector. There are several reasons for offering subsidies in the agricultural sector including: to make the country self-sufficient in a particular food crop or agricultural product; to earn foreign exchange; and to generate income and employment. Furthermore, when African governments have undertaken projects involving irrigation and related infrastructure development, created government departments to or parastatals for supplying inputs or marketing outputs, expanded credit availability at low interest rates, and enlarged extension and agricultural research services, these activities have implicitly embodied elements of subsidy.

In most African countries the agricultural sector, which is the most important sector in terms of income and employment generation, is dominated by peasant subsistent farmers who produce the bulk of the agricultural products and constitute the majority of the population. Since these peasant farmers usually produce for their own consumption, the market mechanism is often not very relevant to their production decisions particularly since their risk bearing capabilities are limited by subsistence and family considerations. Subsidies provide a useful means for overcoming these problems by making production for the market more attractive to them and by reducing their perceived risk of the production system.

The price responsiveness of African farmers to input prices is now well accepted in the literature even though their own- price elasticities of demand for critical farm inputs such as fertilizers, pesticides, hired labour, and improved seeds are significantly negative. This fact, together with the well recognized potential of subsidies as an instrument for rectifying distortion introduced by the existing marketing structure in Africa, provides a very strong argument for using subsidies to attain accelerated adoption of new farm inputs and attaining food self-sufficiency in the African context.

The most common purpose of subsidies in this context is to encourage farmers to use modern inputs such as fertiliser, improved seeds, and protection chemicals to expand food and agricultural production. Such subsidies will help push African farmers from a low rate of adoption of innovative agricultural prices to more aggressive adoption. Because the prices of these new inputs are usually higher vis-a-vis the prices of the commodities they are used to produce, input subsidies also ensure that the appropriate level of input use is maintained even in the face of unfavorable product prices. Since the production of these inputs often exhibits economies of scale, subsidies for inputs will also expand the total domestic market for them and make the local manufacturing of inputs such as fertilizers and pesticides, and the establishment of viable national seed services and other agricultural distribution facilities more economical.

By using subsidies to attain food self-sufficiency a government is indeed saving foreign exchange since the amount of foreign exchange that would otherwise have been used to import food would be saved. However, the saving achieved here may be offset by the foreign exchange that would be needed to import the subsidized inputs.

A more direct way of using subsidies to earn foreign exchange is by using them to encourage the production of export crop production. Two types of export promoting subsidies are possible here. There will be those subsidies that directly promote export crops and those that assist the production of a particular industries but which also indirectly enhance the export position of the country when some of the output is exported. Both types of subsidies are relevant for the African context for several reasons.

First of all by embarking on the goal of food self-sufficiency, African governments would, in essence, be pursuing a policy that shield's their food production sectors from competition with imported food by restricting food imports. Such a policy will tend to appreciate the real exchange rate of African countries and thus make exporting less attractive as compared to producing food crops for local consumption. Export promoting subsidies will help to ensure the right balance between food crops and export crops production and improve the efficiency of resource allocation in the agricultural sector and in the economy at large.

Secondly, the continent's large external debt and the current difficulties faced by most African countries in servicing their debt, means that many of them may find it useful to subsidize export crop production. While the continent's debt servicing burden by itself may not provide sufficient reason for subsidizing export crop production as there exists other means for servicing the continents debt, an export promoting subsidy designed as part of a strategic trade policy certainly has considerable merit for Africa. Such a policy would enable a government to provide

not be responsive to the private actions of farmers themselves, and hence, to price incentives; many of them may be influenced only by direct government non-price interventions. The analysis of long-run response must therefore distinguish changes in supply conditions that are brought about by decentralized private actions from changes that result from centralized public actions.

Supply response may be considered at different levels depending on the type of variable one, question the policy-maker is immediately concerned with:

1. Aggregate agricultural output. If the object of concern is the pace of agricultural output growth or some other economy-wide goal, the relevant notion is the response of an index of agricultural output to some index of the relative price of agriculture such as its barter terms of trade with non-agriculture.

2. Commodity composition of output. Policy-makers may wish to alter the commodity composition of agricultural output (transformation of production structure) by changing intra-agricultural commodity price relations: food products versus raw materials, cereals versus non-cereal foods, export products versus import substitutes, employment-intensive versus capital- or land-intensive products, food production versus agricultural production for export, etc.

3. Marketed surplus. The immediate goal of policy may be to assure a flow of food and raw materials to urban areas sufficient to meet industrialization targets, or to neighboring countries within the framework of sub-regional or regional cooperation. Here, the relevant concept of supply is the marketed surplus and the relevant price is an index of the price relatives between agricultural and non-agricultural consumption goods, or price competitiveness within the sub-region or region.

For both technological and economic reasons, supply response will be different at each of these levels. An important task of empirical analysis is to identify each of them separately and account for their differences.

For many purposes of policy, aggregate data may be sufficient to measure supply responsiveness. However, farm-level or micro studies are also important for two related reasons: (a) farm-level data permit disaggregation by regions, farm size, income and other relevant factors which may influence supply response; such disaggregation can be used to fine-tune policy to the needs and potentialities of different types of farms, crops and regions; (b) micro studies allow better tests of some hypotheses regarding farmer motivation which can provide a deeper understanding of supply behavior. In addition, macro studies frequently fail to distinguish the specific role of price incentives from the effects of contextual factors due to methodological limitations.

(c) Types of Agricultural Food Production Subsidies and Price Support Programmes

Production subsidies

There are several ways of classifying agricultural food production subsidies, many of which are quite ambiguous. One useful way is to classify them according to the level in the production and distribution system at which they are applied. The level of application in this case could be either directly at the farm level or at the national border. Subsidies applied at the farm level permit the amount and type of economic activity in domestic farming to be adjusted relative to the levels which would be dictated by competitive pressures from national and international markets. Those applied at the boundary level alter the relationship between the domestic and international markets by shifting the relationship between domestic and international prices and the volume and direction of trade flows from their free trade levels. Colman and Young (1989) provide the following definitions of the different types of agricultural food production subsidies under these two classification:

1. Farm level

(a) Production subsidy - a fixed or proportionate subsidy paid per unit of output;

(b) Input subsidy - subsidies per unit of a variable input used.

2. Border level

Export subsidies - fixed proportional, or variable subsidies used to promote exports of agricultural food products.

Another method of classifying subsidies is by considering weather they are applied directly or indirectly. Direct subsidies would be applied directly on an output or input to attain a desired objective such as the equalization of prices among regions or among outputs and inputs. These subsidies often involve government payment to some group in the production or marketing chain. Quite often there are restrictions to the application of direct subsidies with regards the type of farm on crop enterprise to be subsidized. For example, direct subsidies may be limited to small farmers or to producers of specific crops.

Indirect subsidies on the other hand, are applied to a related activity in the economy whose promotion contributes towards increased production of a targeted output. For example, fertilizer transport subsidies could be implemented as a way of reducing costs of production in the remote areas of a country. Another type of

indirect subsidy takes the form of concessional credit terms for the purchase of targeted inputs.

Price Support Programmes

Price support policies can take many forms but the most common ones include minimum pricing, regional pricing, and seasonal pricing.

A government usually implements a minimum pricing policy as a way of ensuring that farmers' incomes do not below a minimum level and that the prices and supplies of the commodities involved are stabilized. The policy usually involves a guarantee by the government to purchase all the production of the designated crop marketed at the minimum price. While the developed countries have depended on the market mechanisms to operate their minimum price policies, many developing countries have traditionally relied on parastatal marketing monopolies for this purpose. In both cases, the government usually attempts to set a minimum price that will induce farmers to increase production to levels that food self-sufficiency.

Regional pricing policy is usually designed to improve the efficiency of a government's agricultural pricing policy programme by ensuring that regional price differentials arising from differences with respect to agricultural productivity and transportation costs are taking into consideration in the formulation of price support programmes. The factors which determine any given regional pricing policy include regional cost of production, regional food supply status, transportation cost to the market and the farm gate value of the produce.

Seasonal pricing policies are designed to ensure that the changes in wholesale prices of food from one season to another are kept to the barest minimum. Such wholesale price, stabilization programmes will not only benefit producers, particularly during harvest time by creating increased harvest time demand and maintaining the producer price at an attractive level, it will also benefit consumers who will be able to avoid unduly high prices at the end of the season.

(d) Complementarity between Input Subsidy and Price Support Programmes

In the preceding analyses, government intervention to increase agricultural production through the use of subsidies at both the farm and frontier levels were discussed. The government can also intervene at the domestic market level through a variety of price-support programmes to achieve its objective of increased agricultural production. The instruments open to governments here include the operations of state marketing boards aimed at raising or lowering the prices received by farmers, the implementation of

food subsidies to raise the consumption levels of targeted food items, intervention buying by government parastatal to help establish a floor price, etc. The principal objective of these policy instruments is to try to establish a price that will induce farmers to increase agricultural production to targeted levels.

Both input subsidies and price support programmes have the same objective, that is to increase agricultural production to desired levels. The former achieves this objective by reducing the cost of inputs thereby shifting the supply curve to the right while the later aims at achieving the same objective by increasing the producer price thus increasing the supply by movement along the supply curve.

The choice between the two types of programmes depend on individual country's economic and social conditions and it is possible that the best policy is a combination of the two types of programmes. The major arguments in favor of either of these programmes are outlined below:

(1) The subsidy of purchased inputs encourage the use of these inputs by the farmers. Such a subsidy may facilitate the introduction of new agricultural technology, while the support price does not discriminate among the inputs;

(2) The small-scale farmers may not be familiar with purchased inputs such as fertilizer. Hence, they are not very sensitive to changes in input prices, i.e., the level of purchased input price plays a minor role in their production decision. As they become more familiar with the input, their responsiveness to input price changes may increase. If the increased input price is covered by increased product price, the farmers are likely to be less responsive to input price changes;

(3) An input price subsidy cannot discriminate among products while a price support programme can alter the intercrop mix. Thus, if the government hopes to increase the production of a particular commodity, the input subsidy may encourage the production of alternative commodities, whereas the price support encourages the production of the particular commodity;

(4) If the input subsidy does not increase output as quickly as the support price, the long run cost of the input subsidy programme may be greater than the short run cost of the programme. This increase in cost may occur because, although the input subsidy avoids an immediate increase in input price, it may not avoid a long run increase in input price.

(5) The farmers production decision is likely to be more affected by falls in the product price than increases in input price, particularly if the input only compose a small part of the total cost of production. Thus, the support price will provide a better protection of the farmers' income, resulting in a larger output response;

(6) The input price subsidy only protects the purchased inputs, while the support price encourage a better use of both traditional and new inputs;

(7) It is difficult to subsidize land and farm labor which account for the major part of the input costs. A rise in the support price may subsidize these inputs better than an input subsidy programme.

Evidently, the choice between output and input price incentives will depend on a variety of country- or situation-specific factors. Two studies, nevertheless, provide theoretical and practical pointers of a general nature.

1. Krishna (1976) has argued that, traditionally, input subsidies are preferred on political grounds because food prices do not have to be raised and on budgetary grounds because only farmers using the input benefit. However, he favors output price supports, because: (a) farmers are more familiar and sensitive to them at low levels of development, and (b) output price supports are more easily coupled with price stabilization than input subsidies. This general recommendation is supported by practical considerations.

2. A theoretical argument, which has yet to be empirically tested, favoring input subsidies, has been provided by Parish and McLaren (1982). If average costs rise with production due to technical diseconomies, the cost of a subsidy to a variable input such as fertilizer, which substitutes for fixed factors such as land and complements other variable factors, will be lower than the cost of an output price support. The premises of this argument are supported by empirical observations in the case of fertilizer.

The optimal choice between price supports and input subsidies will depend on a variety of country- or situation-specific factors. Of particular importance are their relative effects on the government and the foreign balance. Nevertheless, a significant general factor favoring price supports is that they can more easily be coupled with price stabilization goals than input subsidies. At the same time, fertilizer subsidies can be expected to have an advantage over price supports in certain specific situations. The relative size of this advantage is presently unknown.

How does the policy-maker decide between supporting output prices versus subsidizing inputs? The estimates of demand and supply elasticities for inputs and outputs are critical to this

choice but the impacts on foreign exchange and budget balances may be equally important. The decision has to rest on the relative social and budgetary costs and opportunities to finance these alternative policies.

The conventional wisdom is that output subsidies are superior because they do not distort the mix of inputs used when raising production. Input subsidies, in this view, are justified only when there are input market imperfections, which is generally the case in Africa. According to Barker and Hayami (1976), the use of fertilizer subsidies in the Philippines to achieve rice self-sufficiency was more cost-efficient than price supports because of various difficulties in its diffusion (ignorance, risk, etc.). Their calculations allowed for an important difficulty with input subsidies: unlike a price support for, say, rice, input subsidies for fertilizer, water, credit, etc., may not be amenable to targeting for specific crops. For instance, the spillover of fertilizer subsidies (intended for rice growers) in the Philippines to sugar producers greatly increased the total cost of the subsidy programme (though not by enough to tilt the balance in favor of price supports).

Ahmed (1978) extended the study of Barker and Hayami to Bangladesh. He found that the net social benefits would be larger and the net cost to government smaller with a fertilizer subsidy than a price support programme for a targeted increase of 0.5 m tons in rice. This was because: (a) the price elasticity of rice supply was small; (b) such as it was, the rice output response undercut jute production, a major foreign exchange earner; and (c) increased fertilizer consumption could be domestically met. It may be added that Ahmed judged the distributional effects to be also superior for fertilizer subsidies because the fraction of output marketed was more unequal across farmsize groups than the fraction of fertilizer consumed.

(e) Costs and Benefits of Subsidy Programmes[1]

An analysis of the effectiveness of subsidy programmes as of other price intervention policies in Africa or elsewhere will depend on an assessment of the costs and benefits of such programmes. The relevant questions to ask here would be:

(1) Who benefits from the subsidies ?

(2) Does the implementation of the subsidy result in a more equitable distribution of income ?

(3) What are the government costs of the programme ?

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[1] See in Annex 1 - Formulae for calculating the different parameters.

(4) How efficient is the resource allocation ?

Obviously answers to the above questions are not easily reached as they involve the collection of data that do not lend themselves easily to collection. A useful starting point for calculating the effect and size of an input subsidy has been provided by Barker and Hayami (1976). Following their methodology, the following key information are needed for the calculation of the costs and benefits of a subsidy programme.

(1) The amount of input needed to produce a desired amount of product;

(2) The input price needed to induce farmers to purchase a desired amount of input;

(3) The cost of input subsidy to the government;

(4) Reduced revenue from Government imports;

(5) Producers' benefits gained as a result of input subsidy;

(6) Net savings of foreign exchange.

Ideally, the way to correctly carry out an assessment of the effects of a subsidy programme would be to first determine what the targeted group was able to accomplish as a result of the application of the programme vis-a-vis what the group would have been prevented from doing in the absence of the programme and measure these against the stated objectives of the programme for which the subsidies were offered. This kind of an assessment would be very difficult to accomplish given the data situation in most African countries. However, since the primary concern of any effort to assess the impact of a subsidy programme is to link the effects of the subsidy to its original rationale, the formulae presented above represent a first and useful step in accomplishing this task.

IV. APPLICATION OF SUBSIDIES IN AFRICA[1]

In comparison to other developing countries, especially in Asia and Latin America, very little empirical work exists that sheds meaningful light on the experiences of African governments with subsidies. The fact is that since colonial times, agricultural subsidies have been used in Africa as a measure to induce farmers to try using new inputs and thus to become convinced of their value. Following the sharp rise in the prices of fertilizers and pesticides that took place after the dramatic

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[1] See in Annex II and III Case studies of Malawi and Indonesia.

increases in crude oil prices in 1973/74, agricultural subsidies gained renewed importance as an instrument for offsetting the sharp rises in the market prices of these inputs. Interest rates on institutional agricultural credit and the supply of water for irrigation have also been accorded subsidies in the development plans of many African countries.

In fact, although appropriate analysis of subsidy issues lack in Africa, most, if not all African countries have tried to influence production by subsidizing the cost of inputs to encourage input use and increase productivity. Such subsidies on inputs in general and fertilizer in particular have reached 100 per cent in some cases. (100 per cent on cotton and irrigated rice fertilizer in Côte d'Ivoire; 100 per cent on phosphate rock in Senegal; 63 per cent on fertilizer in Gambia; 75 per cent in Nigeria; 53 per cent in Sierra Leone; 90 per cent in Guinea; 70 to 80 per cent on cost of irrigation water in Burkina Faso. (Tapsoba, 1988).

The insistence of most orthodox structural adjustment programmes on the drastic reduction if not the total elimination of subsidies by African governments is obviously a cause of concern. Many African countries are therefore caught in a dilemma: they have come to accept subsidies and the theory and practice, of government intervention elsewhere would tend to support their contention that, subsidies provide one of the most effective means to stimulate and generate increased agricultural food production in Africa.

The question is whether, as part of its overall strategy for development in Africa, subsidies have been effective, both from a cost and efficiency point of view. While in many cases, the answer to both questions may indeed be negative, the critical issue is not so much the acceptability of the potential role of subsidies in the overall development of African economies, but rather the poor manner in which subsidies have been managed in Africa in the past.

There is no doubt, therefore, that Africa needs to subsidize its agricultural food production in order to foster food self-sufficiency for the continent. The tables in annex indicate the agricultural food products which should be subsidized. Such subsidy programmes should be targeted and not only addressed the production in terms of quantum, but should also take into account the related sub-sectors which constitute the sine qua non conditions for a socially and economically profitable and sustainable agricultural food production for the continent. These sub-sectors includes storage facilities, conservation techniques, feeder roads, transportation and marketing infrastructures, irrigation and innovation and technological changes.

As regards physical infrastructure, including feeder road network, irrigation, transport and marketing facilities such as appropriate storage processing and market centres, public subsidies should be made to encourage local participation by farmer

organizations, private traders, etc., in mobilizing local resources for investing and/or maintenance in these facilities. Subsidy could also help in the establishment of rural financial institutions to provide financial intermediation for mobilizing rural savings and distributing credit for local development undertakings.

The fulfillment of the marketing, credit and other physical infrastructure conditions would help farmers adopt appropriate technological packages compatible with their constraints. The transfer of these packages from research stations to the farmers would require a certain degree of well targeted subsidy.

Because it is easy to introduce than to remove, and the necessity not to make subsidy a permanent feature of development process and because of the cost involved subsidy programmes must be simple and responsive to needs and political set up, targeted, commodity specific and applied on a country by country basis taking into account the social and economic structures of member countries. Two case studies are presented in annex on Malawi and on Indonesia, which provide good insights into the basic issues of policies involved in the application of subsidy programmes.

V. FINANCING OF THE AGRICULTURAL FOOD PRODUCTION SUBSIDY

As clearly underlined in the previous sections, agricultural subsidy programmes entail important financial costs which cannot be left to the government budget alone to handle.

Consequently, as underlined in AAF-SAP, measures to accompany and facilitate the implementation and the financing of subsidy should include:

(a) setting up buffer-stock system to ensure and stabilize appropriate price level to producers and consumers; the differential between the floor and the ceiling prices should yield resources to assist the financing of subsidy; and in order to provide and keep incentive to producers, guaranteed minimum prices should not be lower than domestic market prices. In addition the institution in charge of buffer stock should have appropriate managerial skills, adequate financial resources, and logistics such as trucks and storage facilities.

(b) gradually eliminate imports of competitive food products via trade barriers (including tariffs and non tariff barriers and/or outright ban on imports) savings from the application of such policy should contribute to the financing of the subsidy programmes.

(c) gradually reduce and eliminate consumer subsidies this saving could relieve pressures on the central budget to reallocate to the financing of subsidy programmes and bring about a more equitable distribution of income.

(d) restrict the growth of food imports in order to reduce its adverse impact on local production;

(e) ensure that the above policy measures are implemented under agro-ecological, economic and social conditions of individual country that are responsive to those conditions.

Because of its political sensitivity, agricultural food production subsidy scheme should involve all related ministries (Finance, Agriculture and Planning...).

VI. AGRICULTURAL FOOD PRODUCTION SUBSIDY AND POLICIES COORDINATION

As indicated by [illegible] of African agriculture (1986), it is clear that resorting solely on food production subsidy as one of the measures to increase food production directly at the farm level to attain food self-sufficiency for the continent is not a sustainable and viable proposition. Unless other sectors and services supportive to food and agriculture are operating effectively and efficiently. This means that farmers will not reap the full benefit of increased production if their surpluses are left in their hands because marketing, transportation, and storage facilities do [illegible] long term sustainable availability of food in such efficient increase in domestic food production, strategy must include it is essential to improve not only the incentive structure of [illegible] and export crop producers but to improve also institutions and infrastructure. There is need for appropriate policies in the following areas:

(a) Consolidating the market for African food production. This includes measures to protect local foodstuffs against imports, improvement in the processing of traditional staple foods, not only grains but also tubers, roots, plantains, etc.

(b) Designing and implementing price policies that would improve the terms of trade in favour of agriculture while allowing for flexibility to take account of international prices and avoiding fixing pan-territorial prices.

(c) Improving the effectiveness of agricultural input delivery systems as well as effective credit programmes

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[1] FAO 1986; and Tapsoba, 1986.

to increase productivity of both land and labour. In this respect disbanding parastatals in charge of inputs in the course of structural adjustment programmes implementation should be done carefully and gradually to avoid disruptions because the private sector may not be prepared to assume this function.

(d) Implementing marketing policies that would improve marketing effectiveness and efficiency. In this connection the role of parastatals should be reassessed and their functions redefined in light of bitter experience of the past. This role and function should be viewed as complementing those of the private sector and limited to those activities that are not expected to be performed by private enterprises. For example:
(i) managing emergency and strategic food stocks;
(ii) selling food to deficit areas or to populations targeted for special food security interventions:
(iii) being a buyer of last resort or intervening in these areas where there is market failure to improve competition; (iv) implementing producer price support and consumer price stabilization to the extent that such an activity is carried out within a reasonable price flexibility framework, i.e. not too far from the market prices; (v) improving market forecast and information on market structure, conduct of operators, prices and margins, deficit and surplus areas, stocks, and disseminating information for use by market operators.

(e) Upgrading producers technical skills through an effective extension service that would transfer research results and spread technological innovations leading to widespread and rapid adoption of profitable technological packages.

(f) Promoting greater participation and involvement of local populations in the decision-making process and in building local institutions and infrastructure. To this end it is important to decentralize the decision-making and the political process so that local populations can fully participate in these decisions that touch their lives. Local projects/programmes will not be successful if local people are not involved in the decisions and do not assume responsibility for implementation.

(g) Pursuing an aggressive research policy and disseminating the findings of research to the farming community with equal emphasis on export and food crops with the objectives of increasing productivity of land and labour, driving down costs of production, promoting diversification and reconquering lost market shares.

(h) Investing in human resources development through better, adapted and relevant training in priority fields including research, management, planning, policy formulation and analysis, market information and forecasting, etc.

(i) Redistributing productive assets such as land through rational and equitable land reforms and providing opportunity to the majority of small farmers for access to credit, inputs, irrigation water, etc.

(j) Building physical infrastructure such as feeder roads, irrigation, storage facilities, market centers and helping establish local institutions to serve the interests of local people. In this respect governments have to be more imaginative than they have been in the past. For example, there is a need to decentralize administrative structures to foster participation of local people in keeping food reserves at the local level, building and maintaining basic infrastructure. Help local populations help themselves and not try to do the impossible task of doing everything for them from the capital city.

VII. SUMMARY AND CONCLUSION

This report examines the critical role that production subsidies can play in enabling the African continent to attain self-sustaining growth and development which can only come from the transformation of the continent's economic and social structures. The continent's production problem is first and foremost one of the transformation of the structure of production with due regard to what is produced and how it is produced. In this regard, the on-going African economic and food crisis is a clear validation of Africa's stated strategy of attaining food self-sufficiency and the need to focus on the production of all of the continent's critical needs and services, especially the major staple which composed the African populations diet (cereals - roots and tubers - meat and fish, vegetable oils, etc.). (see tables in Annex).

It is interesting to note, however, that most of the reform measures currently being imposed on African economies continue to call for an important role for international trade, mainly with the developed market economies to meet the food needs of Africa. The fact that many food surplus developed economies of the world fully appreciate the need for managing their own food economies and have in the past used subsidies and price support policies to create abundant supplies and lowered the prices of food items which are then dumped into African markets thus creating considerable externalities for African agricultural producers, clearly suggests that Agricultural administrators and policy makers alike in Africa should review their position with regard the conflicting goals of

ensuring adequate food supplies for their population at reasonable costs, mainly through developing food self-sufficiency capabilities and continued food importation.

The achievement of the above goal will require the intervention of African governments at the level of production marketing, consumption, foreign trade, well-designed and well targeted incentive schemes to stimulate and generate the needed increased agricultural production in Africa will need to be put in place.

Despite the numerous criticisms currently levelled against them, production subsidies and other price support measures continue to provide one of the most effective tools for attaining the food self-sufficiency goal in Africa. The purpose of this report, therefore, was to examine the role that these policy instruments can play in the goal of attaining food self-sufficiency in Africa.

The report examines the purposes of different types of agricultural support measures, with particular emphasis on agricultural production subsidies and outlines the contemporary theory of these policy instruments. The traditional purpose of production subsidies in Africa has involved agricultural inputs. The report therefore attempts to provide selected case studies involving the application of input subsidies in Africa and examines the issue of subsidies in the context of the Economic Commission for Africa's African Alternative Framework to Structural Adjustment Programmes (AAF-SAP).

The report concludes that, while there exists several policy tools which a government can use to increase the availability of designated products, such as tariffs or quantitative restrictions on imports, domestic content requirements as a condition of domestic production, and even trade liberalization, if food self-sufficiency attainment by increased production of designated food products is the objective of government, a subsidy on the production of these commodities will represent the most economically efficient manner to achieve the objective.

The problems associated with the management of subsidy programmes in Africa include: difficulties in reaching the intended beneficiaries; difficulties in establishing the appropriate subsidy level to offer; long bureaucratic process of determining the subsidy budget allocation; and insufficient inputs procurement procedures and marketing channels.

Because subsidies usually represent a sizeable source of income, many people, including those who are not targeted for assistance, often find ways (both legal and illegal) of profiting from them. As a result, hoarding of the subsidized inputs even though the inputs are being sold through official channels. Consequently, the group of farmers for whom the subsidized inputs

are readily available, the more economically and politically influential farmers end up reaping the greatest benefits.

Another major management problem area in the implementation of subsidy programmes in Africa involves the establishment of the proper subsidy level and its financing. If it is set too low, it may not accomplish its intended purpose of encouraging farmers to adopt or maintain the use of the input. On the other hand, if it is set too high, it may lead to wasteful resource allocation. Furthermore, unless appropriate measures are taken to ensure the financing of subsidy programmes, they may become a heavy burden on the Government budget.

Inefficient inputs procurement procedures poor physical infrastructures, and marketing channels in many African countries have also hampered the efficient operation of subsidy programmes.

These problems, often culminate in a situation where, despite the accepted assumptions that subsidies are a temporary measure and that they would eventually be removed, they tend to remain much longer than anticipated. In many cases, political pressures have forced the continuation of subsidies well beyond its peak period of usefulness. Furthermore, in several uses the burden imposed by subsidy programmes have become quite enormous with the recent increases in input prices thus making the introduction of subsidy programmes very difficult for many African countries and adding significantly to the cost of production of the adopting farmers.

However, the critical issue with subsidy in Africa is not so much the acceptability of its potential role in the overall development of African economies, but rather the ineffective manner in which subsidy programmes have been organized and managed in Africa and the lack of any meaningful analysis of the experiences of African governments with subsidies. There is also a need to correlate the agricultural food production subsidy policy measures with other policies within the framework of African structural development and transformation, recommendations have been made in this paper for the coordination of the subsidy measures with other sectors and services supporting food and agriculture. AAF-SAP therefore has a very important role to play in providing a framework in which country specific agricultural production subsidies can be effectively organized and managed in the continent for the attainment of the declared objective of African food self-sufficiency.

Ahmed, R.
1979 Price policy in Bangladesh agriculture. Baltimore, Johns Hopkins University Press.

Ahmed, R.
1979 Price support for wheat: issues and alternatives. In: Production in Bangladesh. Bangladesh Dev. Stud., 6: 119-138.

Akinola, A.A.
1987 An alternative approach to measuring farm authorities in Nigeria. Food Policy 12: 1.

Altemeier, W.A., Jr., Hall, W.E., Fisher, A.C. and Davis, W.
1981 An economic evaluation of food crop policy alternatives. Policy analysis paper, Multicommodity study, Sub-study 2, Department of Food Crop Economics, Ministry of Agriculture, Lagos.

Askari, H. and Cummings, J.
1974 Cereal price incentives in agriculture: an evaluation. In: Int. J. Agric. Econ., 56(1).

Askari, H. and Cummings, J.
1977 Agricultural supply response: A survey of Econometric Evidence. Praeger, New York, 483 p.

Barker, R. and Herdt, R.
1976 Rice input supply for self-sufficiency. In: Int. Rice Res. Conf., IRRI, Los Baños, 29 p.

Chhibber, A.
1982 Dynamics of price and non-price responses of supply in agriculture. Stanford University, Stanford, CA.

Collier, W.L.
1978 Food problem, unemployment and the green revolution in rural Java. Ithaca (Cornell Publ.), p. 30-35.

Dalrymple, D.G.
1983 Evaluation of fertilizer subsidies. In: J. Mellor (ed.) 1981. Pricing Policy for Development Management, Johns Hopkins University Press, Baltimore, MD, pp. 227-237.

De Wilde, J.C.
1980 Agricultural development in Africa. New York, Praeger publishers.

Dixon, J.A.
1982 Farm commercialization and income distribution: Indonesia, a review of available evidence (mimeo)

FAO,
1969 Food supply situation and crop prospects in sub-Saharan Africa: special report. Rome, FAO.

Fisher, B.
1963 A theoretical analysis of the impact of food surplus disposal on agricultural production in recipient countries. J. Farm Econ., 45: 863-870.

Hayami, Y.
1967 Investment in the fertilizer industry and agricultural development: the Japanese experience. J. Farm Econ., 49: 703-711.

Hayami, Y.
1972 Rice policy in Indonesia: economic development. Am.J. agric. econ., 54: 10-17.

Hedley, D.D.
1987b Diversification: concepts and practices in Indonesian agriculture. Paper presented at the Workshop on System Research and Development in Indonesia, 24-26 February 1987, Cisarua, Bogor, Indonesia (to be published).

Herdt, R.
1970 A disaggregate approach to aggregate supply. Am. J. Agric. Econ., 52: 512-520.

Klumper, S.S.
1986 Towards an approach to food planning: the case of Indonesia. Appropriate technique for development planning. Heidelberg University Press, Heidelberg, pp. 93-117.

Krishna, R.
1967 Agricultural price policy and economic development. In: H. Southworth and B. Johnston (Editors), 1967. Agricultural development and economic growth. Cornell University Press, Ithica, NY.

Krishna, R.
1982 Some aspects of agricultural growth, price policy and equity in developing countries. Food Res. Inst. Stud., 18: 219-260.

Lipsey, R.G. and K. Lancaster
1956 The general theory of the second best. Review of Economic Studies, 24 (1).

Mears, L.A.
1981 The New Era Economy of Indonesia. Gadjah Mada Press, Bulaksumur, Yogyakarta, Indonesia.

Parish, R. and McLaren, K.
1982 Relative cost-effectiveness of input and output subsidies. Aust. J. Agric. Econ., 26: 1-15.

Peterson, W.
1979 International farm prices and the social cost of cheap food policies. Am. J. Agric. Econ., 61: 12-21.

Pitt, M.M.
1983 Farm level fertiliser demand in Java: a meta-production function approach. Am. J. Agric. Econ., 65:502-508.

Raj, K.N.
1982 Agricultural stagnation in China and India: Role of price and non-price factors. Economic and Political Weekly, January 23.

Reca, L.
1976 Argentina: country case study of agricultural prices and subsidies. Staff Working Pap. 286, World Bank, Washington, D.C.

Robinson, R.
1986 Indonesia: The Rise of Capitalism. Southeast Asia Publications Series, 13. Allen, Unwin, North Sydney, N.S.W.

Rosegrant, M. and Herdt, R.
1981 Simulating the impacts of credit policy and fertilizer subsidy on Central Luzon farms. Am. J. Agric. Econ., 63: 655-665.

Sanders, J. and Ruttan, V.
1978 Biased choice of technology in Brazilian agriculture. In: H. Binswanger and V. Ruttan (Editors), Induced Innovation. Johns Hopkins University Press, Baltimore, MD.

Tabor, S.R., Soepani, Altemeier, K., Djagabo Werdoyo, Adinugroho, B. and Purnomo, S.
1987 Trends in agricultural supply and demand to the year 2000. Draft Report, Supply and Demand study. Directorate of Food Crop Economics, Ministry of Agriculture, Jakarta.

Tabor, S.R. et al
1988 Final report. Supply Demand study. Directorate of Food Crops Economics, Ministry of Agriculture, Jakarta.

Tapscoba, E.K.
1988 Food Security Policy issues in west Africa

Taylor, L.
1983 Structuralist Macroeconomics. Basic Books, New York, 234 pp.

Timmer, C.P.
1976 Fertilizer and food policy in LDCs. Food Policy, 2: 143-154.

Timmer, C.P., Falcon, W.P. and Pearson, S.R.
1983 Food Policy Analysis. Johns Hopkins University Press, Baltimore, MD.

United Nations Economic Commission for Africa
1989 African Alternative Framework to Structural Adjustment Programmes for Socio-Economic Recovery and Transformation. Addis Ababa, UNECA.

The World Bank
1989 Sub-Saharan Africa: from crisis to sustainable growth. Washington D.C. The World Bank.

World Bank
1986 World Development Report 1986. Oxford University Press for the World Bank, New York.

Yotopoulos, P. and Lau, L.
1974 On modelling the agricultural sector in developing countries: an integrated approach of micro and macroeconomics. J. Dev. Econ., 1: 105-137.

Table 1 - Percent share of Total Calories per capit per day for commodity groups, 1985/85

Subregion	1983/85										
	Cereals	Roots and tubers	Vegetable oil	Sugar	Pulses	Milk	Meat	Bananas + plantains	Vegetables	Fruit	Citrus
North Africa	59.4	1.6	11.1	11.4	2.2	5.7	3.0	0.1	2.1	2.3	0.5
West Africa	46.6	25.0	13.8	3.6	3.1	1.3	1.9	2.8	1.4	0.7	0.3
Great Lakes	20.3	51.1	10.3	1.3	6.8	0.5	1.0	6.5	1.4	0.7	0.1
Central Africa	36.3	46.3	13.9	4.5	3.6	1.4	3.0	6.2	0.9	1.7	0.1
Eastern and Southern Africa	57.0	16.2	5.7	4.9	5.6	2.8	2.9	3.1	0.7	0.9	0.1
Africa 1/	50.5	17.3	10.8	6.4	3.9	3.0	2.5	2.5	1.4	1.2	0.2

1/ Excludes the following countries, Comoros, Cape Verde, Sao Tome and Principe, Equatorial Guinea Guinea Bissau, Djibouti.

Source: Compiled and calculated from at 2000 Computer Print-Outs. 13 July 1987. FAO, Rome.

ate portion of volume

	Volume	%	Volume	%
	27	1.4	1154	5.6
	03	10.0	2759	13.6
	46	90.0	10680	52.9
	3	0.0	974	5.0
	74	3.6	1085	5.3
	460	9.0	2756	13.4
	0	0.0	1055	5.1
	1892	25.0	20493	30.0
	360	1.9	1945	8.2
	1972	10.6	3611	15.3
	1973	86.3	17096	72.3
	197	1.0	1035	4.2
	18497	93.0	23661	95.0
	939	5.0	2282	10.0
	1	0.2	386	2.9
	1	0.5	4362	0.6
		0.1	349	0.2
	1	0.0	1675	0.0

Table 3 - Net Production Demand and SSR of Food Commodities in Africa, 19

	North Africa subregion						
	Net Production	Demand Food	Demand for All Uses	Ratio SSR	Ratio SSR	Net Production	Dem Foo
	PN	DF	DA	PN/DF	PN/DA	PN	DF
Wheat	78..	16335	19358	0.56	0.4.	41.58	21
Rice	221.	2172	2456	1.02	1.05	3297	33
Maize	1347	2303	6475	1.05	0.59	3333	19
Barley	79..	1957	2776	1.12	0.79	0	2
Millet	10..	470	891	1.06	0.49	5371	51
Sorghum	2108	1562	1650	1.33	1.24	4094	40
Other Cereals	169	16	191	10.56	0.88	181	1
Cereals, Total	17.35	24815	34891	0.71	0.51	16113	1021
Potatoes	330	2163	2309	1.19	0.84	70.6	
Sweet Potatoes	28	718	343	1.12	0.91	18572	1467
Cassava	111	114	120	0.19	0.89	15416	1391
Other Roots & Tuber	91	97	103	1.07	0.90	2240	215
Roots and Tuber, total	2701	3592	3301	1.08	0.85	16299	3088
Pulses, total	892	783	1062	1.14	0.84	1273	111
Vegetable Oils	709	1647	1613	0.49	0.44	2134	168
Milk	7245	9140	10231	0.79	0.70	1292	237
Eggs	315	342	394	0.92	0.80	320	27
Meat, total	1674	2058	2063	0.81	0.81	1377	144
Total calories/ caput/day	1958	2766	3575			2009	197

'SS

West Africa subregion				Central Africa subregion				
Demand for All Uses	Ratio SSR	Ratio SSR	Net Production	Demand Food	Demand for All Uses	Ratio SSR	Ratio SSR
DA	PN/DF	PN/DA	IM	DF	DA	PN/DF	PN/DA
2304	0.30	0.02	5.8	474	283	0.02	0.02
5996	0.62	0.55	115	320	434	0.53	0.49
1984	0.13	0.14	191	518	676	1.07	0.91
284	0.00	0.00	0	120	121	0.00	0.00
6353	1.04	0.82	138.6	690	815	1.07	0.90
4814	1.01	0.84	0	0	6	0.00	0.00
332	0.98	0.82	66.3	97	111	0.66	0.59
24017	0.62	0.68	1474	1325	2177	0.77	0.61
105	0.79	0.67	119	71	258	0.36	1.00
24056	1.27	0.77	693	781	1051	1.14	0.84
17659	1.10	0.86	4351	2141	2662	1.05	0.84
2427	1.02	0.82	705	580	937	1.21	0.75
41927	1.16	0.81	4133	1678	4078	1.12	0.85
2601	1.14	0.78	169	149	189	1.13	0.89
2241	1.26	1.93	325	182	255	1.23	0.93
2625	0.94	0.49	209	315	315	0.57	0.57
349	1.10	0.98	14	13	16	1.07	0.87
1445	0.95	0.95	203	227	229	0.89	0.88
3546			1906				

Table 3 (cont'd)

	Great Lakes subregion					K
	Net Production	Demand Food	Demand for All Uses	Ratio SSR	Ratio SSR	Net Producti
	PN	DF	DA	PN/DF	PN/DA	PN
Wheat	25.8	324	237	0.11	0.10	1125
Rice	265	340	378	0.84	0.76	3501
Maize	894	928	1073	0.95	0.82	7841
Barley	0	74	72	0.00	0.00	909
Millet	62	60	68	1.03	0.91	985
Sorghum	498	501	575	0.99	0.87	3526
Other Cereals	0	13	13	0.00	0.00	1005
Cereals, Total	1755	2140	2413	0.82	0.73	19911
Potatoes	317	358	350	1.43	0.90	1736
Sweet Potatoes	1800	1751	1991	1.03	0.90	3075
Cassava	12170	14727	16580	1.01	0.80	14951
Other Roots & Tuber	189	184	187	1.03	0.96	945
Roots and Tuber, total	15176	14920	18518	1.02	0.82	20708
Pulses, total	654	604	666	1.08	0.95	2056
Vegetable Oils	350	306	339	1.14	1.03	869
Milk	119	263	261	0.45	0.44	4182
Eggs	10	8	11	1.25	0.90	244
Meat, total	114	147	147	0.78	0.78	1875
Total calories/ caput/day	2192					1925

Source: At 2000, Computer Print-Outs, 1987, FAO,

tern and Southern Africa subregion

Demand Food	Demand for All Uses	Ratio SSP	Ratio SSR
DF	DA	PN/DF	PN/DA
2675	2919	0.41	0.38
3164	3847	0.79	0.65
10488	12904	0.93	0.76
1005	1137	0.92	0.81
1106	1278	0.89	0.77
2780	3301	0.90	0.79
1139	1360	0.85	0.79
22357	26546	0.85	0.71
1500	2009	1.15	0.86
2904	3611	1.06	0.85
14219	17264	1.05	0.87
921	1009	1.02	0.93
19544	23693	1.06	0.87
1915	2340	1.07	0.88
653	799	0.87	0.71
4961	5464	0.84	0.76
226	271	1.07	0.90
1664	1859	1.01	1.01
1973	2409		

ome.

Table 4 - Food Self-Sufficiency Ratio in 1983 and 2000 in Africa

	Demand in 1000 MT					Production in 1000 MT	
	1983						
	Production (P)	Demand for Food (F)	Demand for all uses (D)	Ratio P/F	Ratio P/D	Production (P)	Demand fo Food (F
Wheat	7412.7	21076.6	24611.3	0.35	0.30	12147.6	34662.
Rice	8863.0	11483.8	13116.2	0.77	0.68	17469.2	20170.
Maize	18467.6	16044.1	20993.3	1.15	0.88	36021.1	29119.
Barley	2727.8	2948.8	5047.3	1.16	0.74	7114.7	6742.
Millet	8906.9	7056.5	9222.3	1.26	0.97	17304.3	13469.
Sorghum	9267.8	8107.5	9719.5	1.14	0.95	18575.5	15361.
Other cereals	1616.6	1324.5	1679.8	1.22	0.96	2889.5	2365.
CEREALS TOTAL	57762.4	68023.8	86189.4	0.85	0.67	112011.5	113911.
Potatoes	5811.4	3363.6	5184.8	1.30	0.97	8718.4	6645.
Sweet potatoes	29878.7	19466.9	29873.7	1.53	1.00	51036.6	34678.
Cassava	53917.0	42302.1	52890.5	1.28	1.00	69862.4	73277.
Other roots + tubers	4367.6	3955.6	4971.5	1.26	1.00	7950.5	5935.
ROOTS, TUBERS TOTAL	92774.9	69730.2	92920.5	1.33	1.00	137557.9	120536.
PULSES, TOTAL	5591.3	4419.1	5717.6	1.27	0.98	9085.7	7565
Vegetable oils	4233.3	4231.7	5344.9	1.00	0.79	6555.6	7712
Vegetables	21335.4	19305.2	21677.1	1.10	0.98	35805.8	32365
Bananas	4819.5	3151.2	4691.4	1.53	1.03	8217.4	5418
Plantains	17023.9	8794.4	17023.9	1.94	1.00	25922.9	15290

000			Growth Rates per annum 1983-2000			Growth rate p.a. 1961/63-1982/84		
Demand for all uses (D)	Ratio P/F	Ratio P/D	Production (P)	Demand for Food (F)	Demand for all uses (D)	P	F	D
40117.8	0.35	0.38	2.3	3.0	2.9	1.3	3.1	4.9
22908.3	0.87	0.76	4.1	3.4	3.3	3.8	4.3	4.3
44648.5	1.14	1.11	4.0	3.6	3.5	2.7	3.3	3.5
10803.3	1.10	0.66	1.9	2.2	4.6	1.0	2.1	1.4
18047.1	1.01	0.99	4.1	3.9	4.0	1.3	1.5	1.6
18548.2	1.01	1.00	4.3	3.8	3.9	0.3	1.4	0.8
3318.3	1.21	0.87	3.5	3.5	4.1	0.8	1.1	1.4
155194.6	0.93	0.86	4.5	3.4	3.5	1.1	3.2	3.0
8693.4	1.31	1.00	3.3	3.2	3.1	5.8	3.4	5.2
60950.8	1.47	1.01	3.3	3.5	3.1	2.7	3.3	2.7
90005.1	1.23	1.00	3.3	3.3	3.2	1.3	2.3	0.4
1902.6	1.34	1.00	2.8	2.4	2.8	1.3	1.4	1.3
15717.9	1.31	0.99	3.2	3.3	3.1	2.5	2.7	3.1
9340.8	1.20	0.97	2.9	3.2	2.9	1.8	2.4	2.3
9630.4	0.85	0.68	2.6	3.6	3.5	0.3	4.2	3.9
366191.6	1.11	0.99	3.1	3.1	3.1	3.3	3.6	3.5
8001.7	1.52	1.03	3.2	3.2	3.2	2.5	3.0	3.1
26025.6	1.70	1.00	2.5	3.3	2.5	2.5	3.0	2.5

Table 4 - (cont'd)

	Demand in 1000 MT					Production in 1000 M	
	1983						
	Production (P)	Demand for Food (F)	Demand for all uses (D)	Ratio D/F	Ratio P/D	Production (P)	Dema Foo
Citrus fruits	1216.4	3040.6	3019.3	1.39	1.13	6732.7	4
Fruits	11067.1	16677.4	10395.5	1.15	1.02	18547.6	16
Beef	2536.2	2839.1	2843.9	0.49	0.49	4251.0	4
Mutton	1146.4	1166.6	1167.0	0.96	0.96	2005.8	2
Pig meat	276.1	292.1	292.2	0.95	0.94	592.7	
Poultry meat	2176.1	1271.8	1274.9	0.92	0.92	2677.3	2
MEAT TOTAL	6134.8	5569.6	5577.0	0.91	0.92	9526.9	10
Milk and Dairy Products	13430.0	16422.2	16307.9	0.82	0.73	23311.0	27
Eggs	926.8	838.0	1004.4	1.11	0.92	1710.9	1
Total calories per caput/ per day	2215.1	2180.2	2764.0	1.02	0.80	2331.5	2

1/ Excludes Djibouti, Comoros, Cape Verde, Equatorial Guinea, Guinea-Bissau.

Note: Computed by the Joint ECA/FAO Agriculture Division

Source: FAO at 2000 Computer Print Outs, 24 Sept. 1987, Rome.

2000				Growth Rates per annum 1983-2000			Growth rate p.a. 1961/63-1982/84		
for (F)	Demand for all uses (D)	Ratio P/F	Ratio P/D	Production (P)	Demand for Prod (F)	Demand for all uses (D)	P	F	D
2.1	5411.5	1.40	1.24	7.6	2.7	3.7	4.5	4.6	
1.4	12167.0	1.15	1.01	3.1	1.1	3.1	2.4	2.5	2.5
1.9	4727.4	0.89	0.69	3.1	5.1	3.1	2.6	2.6	2.6
7.2	2037.3	0.98	0.96	3.3	3.3	3.3	2.0	2.1	2.1
7.0	617.0	0.95	0.84	4.6	4.8	4.8	3.7	3.6	3.6
2.2	2747.3	0.98	0.91	5.0	4.6	4.6	5.7	6.1	6.1
2.0	10180.3	0.94	0.91	3.7	3.5	3.4	3.0	3.2	3.2
1.5	10599.7	0.81	0.73	3.3	3.1	3.0	3.9	4.2	4.2
3.0	1762.4	1.16	0.97	3.7	3.2	3.8	4.9	5.1	5.1
4.5	2937.0	1.02	0.79	0.3	0.3	0.4	-1.1	0.4	0.3

Seychelles and Sao Tome & Principe from the 5 MULPOCs.

Table 5 - Daily share of Food Groups, 1983/85 in Africa

Country	% of total calories consumed											
	Cereals		Roots & tubers	Pulses	Meat	Milk	Sugar	Vegetable	Banana & plantains	Citrus	Fruit	Vegetable oil
	Total	Coarse Grains										
North Africa	59.4	16.2	1.6	2.2	3	5.7	11.4	2.1	0.2	0.5	2.3	11.1
Algeria	56.8	4.7	2.2	2.1	2.1	8.2	13.2	1.1	0	0.4	2.7	11.4
Egypt	62.6	16.8	1.4	3.2	2.6	3.3	11.4	3.9	0.2	0.7	2.2	10.3
Libya	42.7	2.3	1.5	1.8	5.7	8.7	12.3	2.6	0	0.5	5.1	17.2
Morocco	64.6	18.5	1.3	2.5	2.5	2.6	12	1.3	0	0.5	1.4	10.3
Tunisia	59.1	3.4	1.4	2.7	2.8	4.2	9.1	3.9	0.1	0.4	3.1	13.2
Sudan	48.6	37.4	1.8	2.1	5.8	13.7	11.8	1	0.2	0.2	2.5	12.1
West Africa	45.6	31.1	25	3.1	1.9	1.3	3.6	1.6	2.4	0.1	0.7	13.5
Benin	36.8	30.1	36.5	2.8	2.4	0.8	0.9	0.9	0.2	0.1	1.8	16.3
Burkina Faso	71.1	63.7	1.9	9.4	2.4	2.1	2.4	0.5	0.1	0	0.5	9.6
Cote d'Ivoire	39.3	12.1	27.6	0.3	2.5	1.8	5.1	2	7.7	0.1	0.8	12.2
Gambia	61.3	24.9	1.3	2.3	2.5	2.3	12.4	0.4	0	0	0.3	17.1
Ghana	31.4	23.9	46.1	0.4	1.2	0.4	1.6	1.1	5.9	0.2	0.2	10.6
Guinea	41.7	6.3	16.6	3.5	1.6	1	3.8	5.8	8.3	0.8	0.5	15.7
Liberia	48	0.6	22.5	0.6	2.1	0.7	3.3	1.3	4	0.1	0.2	17
Mali	76.8	57.2	2.8	3	3.7	2.5	3.3	0.9	0	0	0.1	6.8
Mauritania	51.4	13.4	0.5	4.3	3.3	21	9.2	0.4	0	0	2.1	7.3
Niger	68.4	63.4	4	10	3.2	3.3	2	1	0	0	0.7	7.2
Nigeria	47.2	31	30.2	3	1.6	0.7	3.6	1.4	2	0	0.7	14.2
Senegal	56	30.6	0.6	0.9	2.7	2.7	5.5	0.6	0.1	0.1	0.5	20.3
Sierra Leone	59.2	7.1	6.4	4.1	2.1	0.5	1.9	1.7	1	0.7	0.9	22.5
Togo	46.1	36.1	30	4.3	2	0.4	4.9	0.7	0.3	0.1	0.5	10.5
Guinea Bissau	71.7	23.4	6.2	0.8	3.2	1.2	1.5	0.6	2.9	0	0.9	10.8
Cape Verde	58.7	31.6	2.9	5.3	2.2	3.7	13.9	0.5	0.3	0	2.4	9.9
Great Lakes	20.3	15.6	51.1	6.8	1	0.5	1.3	1.4	0.5	0.1	0.7	10.3
Burundi	33.2	30.6	23.9	23.9	0.9	0.9	0.7	1	6.3	0	0.9	8.1
Rwanda	23.2	21.1	34.9	20.7	1.1	2	1.2	0.9	13.5	0	0.4	2.7
Zaire	17.8	12.2	58.1	1.6	1	0.2	1.4	1.5	1.4	0.2	0.7	12
Central Africa	38.3	29.2	26.3	3.6	3	1.4	4.5	0.9	6.2	0.1	1.7	12.9
Cameroon	43.6	35	17.9	4.4	2.7	0.8	5.1	1.2	9	0	3.1	14.7
CAR	21.3	16.1	51.1	1	3.9	0.3	0.5	0.5	4.8	0.1	0.3	15.8
Congo	22.8	8.4	43.6	1.4	2.1	1.2	4.3	0.5	4.5	0	3.7	14.9
Chad	51.2	44.7	17	5.5	3.2	3.9	4.6	0.6	0	0	1	10.9
Gabon	20.1	6.2	38.5	0.1	4.6	1.9	5.7	0.8	15.2	0	1.8	11
Sao Tome & Principe	37.2	6.1	13.4	4.6	1.5	2.3	5.5	0.5	1.7	0	1	33.8

Table 5 - (cont'd)

Country	% of total calories consumed											
	Cereals	Coarse Grains	Roots & tubers	Pulses	Meat	Milk	Sugar	Vegetable Oils	Fruits & plantains	Citrus	Other Fruit	Vegetable oil
Eastern and Southern Africa	57	43.6	16.2	5.6	2.9	2.6	4.9	0.7	3.1	0.1	0.7	5.7
Botswana	63.2	52.2	1	6.2	4.5	8.6	11.1	0.7	0	0.1	1	3.4
Ethiopia	74.1	59.2	3.2	10.1	2.7	3.7	2.4	0.4	0.2	0	0.2	3.5
Kenya	63.9	56.5	8	3.8	3.3	4.9	9.3	0.6	1.9	0	0.6	4.1
Lesotho	78.1	61.3	0	2.9	3.3	2.5	8.3	0.8	0.1	0	0.9	2.5
Madagascar	60.3	4.1	20	1.6	6	0.4	3.8	0.1	1.4	0.3	1.7	3.2
Malawi	71.2	60.4	5	7.2	1.4	0.5	3.3	0.8	0.2	0	1.3	6.8
Mauritius	35.3	4.9	1.4	3	2.2	6.9	17.3	0.8	0.3	0	0.2	12
Mozambique	35.6	24.6	42.6	2.6	1.7	1	3.9	0.4	0.5	0.1	1	10.6
Comoros	43.2	4.1	31.4	2.1	2.2	1.3	3.4	0.2	6	0	0.5	9.6
Angola	35.5	21.8	33.3	3	4.1	3.4	4.3	0.8	2.4	0.4	0.6	12.2
Somalia	52.7	36.1	1.1	1.6	6.1	16.5	9	0.2	0.2	0.2	2.3	10.2
Swaziland	53.8	46.5	0.5	1.2	5.8	4.6	21.8	0.6	0.1	0.8	1.1	7.9
Tanzania	47.1	38.7	27.1	5.7	2.2	1.9	2.5	1.2	6	0	1	4.9
Uganda	28.7	27.4	34.7	10	2.3	2	1.5	0.5	14.8	0	0.1	5.3
Zambia	75.1	67.6	4.9	0.3	2.1	0.9	5.3	1	0	0	0.6	6
Zimbabwe	68.3	57.6	1.5	2.5	2.7	1.8	13	0.5	0.6	0.2	0.1	8.7
Africa 1/ (1983)	50.5	28	17.3	3.9	2.5	3	6.4	1.4	2.5	0.2	1.3	10.8

1/ for 43 African countries excludes South Africa, Namibia, Seychelles, Comoros, Cape Verde, Sao Tome & Principe, Equatorial Guinea, Guinea Bissau, Djibouti

Source: Compiled and calculated from by JEVAD AT 2000 Computer Print-Outs, 13 July 1987, FAO, Rome.

Commodity Aggregates:

Cereals:	Wheat, rice, paddy + maize + barley + sorghum + other cereals
Coarse Grains:	Cereals - (wheat + rice)
Roots + tubers:	Potatoes + sweet potatoes + yams + cassava + other roots
Pulses:	vetches + lupins + lentils + pigeon pees + beans + broad beans + peas + chick peas + cow pea + other pulses
Meat:	Beef + veal + buffalomeat + mutton + lamb + goat meat + pig meat + poultry meat
Milk:	Milk and dairy products (whole milk equivalent)
Sugar:	Sugar from sugar cane and sugar beet
Vegetable Oils:	Vegetable oil from soybeans, groundnut, sesame seed, coconuts, sunflower seed, palm oil/ palm - kernel oil and all other oilseeds

Table 6 - Methodology and Main Assumption of the Scenario

1. First Projections of domestic demand made by:

(i) Country; (ii) Commodity; on the basis of population and GDP growth projections

(a) Population Growth Rates; (b) GDP Growth Rates

	(a)					(b)		
	Medium-variant Population		Population Growth Rate per annum			GDP Growth Rate per annum		
	1985	2000	1970-80	1980-85	1985-2000	1973-80	1980-86	1986-2000
Africa (Sub-Sahara) (38)	416	675	3.0	3.1	3.3	3.1	0.5	3.3
North Africa (3)	265	387	2.7	2.7	2.5	4.3	2.2	4.0

Demand projections are based on the GDP growth rates for the period 1983-2000.

2. Initial assumptions follow as to national self-sufficiency goals of developing countries.

3. The implied tentative "targets" of production evaluated and modified for their technical and economic feasibility taking into account the full range of relevant factors:

(i) agricultural resources
(ii) technology
(iii) productivity trends
(iv) input requirements and required policies

4. Food demand

(a) per caput is projected using (i) the base year data for this variable (the three year average (1982/84); (ii) the FAO food demand model (a set of estimated food demand functions -Engels curves - for up to 52 separate commodities in each country) and (iii) the assumptions of the growth of per caput incomes (GDP). The results are adjusted as required by the commodity and nutrition specialists taking into account the historical evolution of per caput demand.

Table 6 (cont d)

(b) total projected food demand obtained by simple multiplication of the projected per caput levels with projected population.

Note: For detailed information please refer to agriculture Toward (AT) 2000, FAO, 1987, paras: 8-3.57; 3.49-3.51 and 3.52 to 3.55.

Costs and benefits of Subsidy Programmes

The formulae for calculating the different parameters are as follows:

Level of Needed Input

The amount of input needed to produce a desired amount of product is:

$$X_S = X_{Ns}\left(1 + \left[\frac{Q_S - Q_{Ns}}{Q_{Ns}}\right]\right)\frac{1}{e_p}$$

Where

X_S = Amount of input needed to produce a desired amount of product

X_{Ns} = Amount of input purchased without subsidy

Q_{Ns} = Amount of product produced without subsidy

Q_S = Amount of product produced with elasticity

e_p = Production elasticity

The Desired Input price level

The subsidized input price necessary to induce farmers to purchase X_S, the amount of input needed to achieve a targeted production level is as follows:

$$P_S = P_{Ns}\left[\frac{X_S}{X_{Ns}}\right]^{\frac{1}{e_d}}$$

where,

P_S = The input price needed to induce farmers to purchase a desired amount of input

P_{Ns} = Price of the input without subsidy

X_S = Amount of input purchased with subsidy

X_{Ns} = Amount of input purchased without subsidy

e_d = Price elasticity of input demand with respect to the product

Cost of the Input Subsidy Programme

The cost of the input subsidy programme to the government is the difference between what the government pays for the input (input costs) and what it sells to the farmer (input revenue). This cost is calculated as follows:

$$GC = X_S (P_S - P_{NS})$$

where,

GC = Actual cost of the subsidy programme to the government

X_S = Amount of input purchased with subsidy

P_S = Price of input with subsidies

P_{NS} = Price of input without subsidy

Reduction in Government Revenue

This is a measure of what the government would have to pay if it had to import the product in order to achieve some kind of security with respect to the product. It is calculated as follows:

$$GR = (P_D - P_W) (Q_S - Q_{NS})$$

where,

GR = Reduction (or possibly increase) in government revenue resulting in a decrease in the import of the product

P_D = Domestic consumer price for the product

P_W = Import price for the product

Q_S = Amount of product produced with subsidies

Q_{NS} = Amount of product produced without subsidies

Farmers' benefits

Producers' benefits which represent the extra income that the farmers obtain as a result of the input subsidy is calculated as follows:

$$P_B = (P_{NS} - P_S) X_{NS} + (1 - P_T)$$

$$(Q_{Ns} - Q_S)\ P_D - P_S\ (X_S - X_{Ns})$$

Where,

P_B = Producers' benefits

P_{Ns} = Price of input without subsidy

P_S = Price of input with subsidy

X_{Ns} = Amount of input purchased without subsidy

X_S = Amount of input purchased with subsidy

M_p = Ratio of unit processing and marketing cost to consumer price of product

Q_{Ns} = Amount of product produced without subsidy

Q_S = Amount of product produced with subsidy

P_D = Domestic consumer price for the product

Net Savings in Foreign Exchange

The net savings in foreign exchange indicates the saving achieved as a result of not importing the product. It is calculated as follows:

$$S = P_W\ (Q_S - Q_{Ns} - P_{Ns})\ (1 - M_P)\ (X_S - X_{Ns})$$

Where,

S = Net savings of foreign exchange

P_W = Import price of the product

Q_{Ns} = Amount of the product produced without the subsidy

Q_S = Amount of the product produced with subsidy

P_{Ns} = Price of the input without subsidy

X_{Ns} = Amourt of the input purchased without subsidy

X_S = Amount of the input purchased with subsidy

M_P = Ratio of unit marketing cost to the retail price of the input

The above estimates represent straight forward calculations of the costs and benefits that can be attributed to the application of

any subsidy programme. The usual procedure is to either compare two groups, one with subsidy and the other without or to do a comparison of the same group before and after the application of the subsidy programme. Since the items for which subsidies could be offered in Africa range from recurrent items such as seeds and fertilizers to capital goods such as irrigation equipment, and from tangible things such as increases in input use to untangible ones such as increased levels of employment, it is clear that the above formulae for calculating the benefits and costs of subsidies will fail to gauge the impact of a subsidy programme in a precise manner.

[illegible] Issues in Malawi*

1. Economic [illegible]

The deterioration [illegible] social and economic indicators began to worry policy-makers as early as 1979, but the government did not respond coherently to emerging difficulties until later. A number of initiatives were [illegible] (increasing the consumer price of maize by 37 per cent in 1981 and attempts by commercial banks to upgrade the productivity of tobacco estates), but they did not form part of a systematic reform programme. The government did not have the analytical or organizational capacity to diagnose the problem and to outline ways of solving it. When confronted with such assessments by the World Bank, the IMF, and USAID, government officials reacted in different ways. Some high officials had clearly prepared for these reviews and their comments were serious and thoughtful. Other key officials, however, tended to be evasive or circumspect. There was no attempt either to put together a collective government response to these critiques offered by outside agencies or to develop an alternative blueprint.

The chronology of economic policy events helps in understanding the gathering momentum of the reform effort. The chronology of policy events was as follows:

October 1979:	IMF Stand-by Agreement (30 months)
April 1980:	IMF Revised Stand-by Agreement (24 months)
June 1981:	World Bank Structural Adjustment Loan I
August 1982:	IMF Stand-by Agreement (12 months)
September 1982:	Paris Club Agreement on Debt Rescheduling
March 1983:	London Club Agreement on Debt Rescheduling
April 1983:	World Bank/International Fund for Agricultural Development Smallholder Fertilizer Loan
September 1983:	IMF Extended Fund Facility Agreement (36 months)
October 1983:	Paris Club Agreement on Debt Rescheduling
December 1983:	World Bank Structural Adjustment Credit II
December 1985:	World Bank Structural Adjustment Credit III
March 1986:	Consultative Group Agreement on External Aid
April 1986:	Cancellation of IMF Extended Fund Facility Agreement
December 1986:	World Bank Supplement to Structural Adjustment Credit II

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* Adapted from Ravi Gulhati: Malawi (promising Reforms, bad luck) Economic Development Institute of the World Bank. EDI Development Policy Case Series. Analytical case studies. Number 3.

A series of IMF stand-by agreements, aimed mainly at stabilization, were interspersed with structural adjustment loans embodying policy agreements with the World Bank that focused on supply-side measures. The Bank and the IMF apparently played a galvanizing role in the evolution of Malawian policy. Staff of these international organizations undertook the bulk of the analysis (or helped the government to define, supervise, and finance expatriate consultants who did the policy analysis) that underpinned the reforms. The posture of the international organizations was that Malawi could obtain scarce, quick-disbursing external funds provided the government agreed on changes in economic policies. Such conditional lending helped to some extent to fortify senior civil servants keen on carrying out reforms. Their influence in decisions and in their implementation varied, however, from topic to topic and from year to year.

2. Agriculture Policy Changes

Little progress was achieved initially in phasing out the bias against pricing of export crops. The year 1982 saw a large increase in maize prices, tilting incentives further in the direction of food self-sufficiency (see table 7 below). Maize purchases by ADMARC [1] rose substantially, allowing the government to build up the strategic food reserve. Later on, the producer prices of export crops were raised sharply. For example, the producer price of dark fired tobacco as a proportion of its border price rose from 20 per cent in 1981 to an average of 29 per cent in 1983-85. Production responded to these incentives. ADMARC maize purchases reached a peak in 1984/85 and then declined. The sharp fall in 1986/87 was the result not only of a deterioration in relative maize producer prices but also of a loss of ADMARC's credibility owing to its inability to buy all that farmers offered in 1985/86. Furthermore, cross border purchases from Mozambican farmers contracted owing to growing guerrilla activity.

The government process for determining producer prices involved technical work within ADMARC and the Agriculture Ministry, leading up to recommendations that were considered by an interministerial producer price advisory committee. Final decisions, however, were taken by President Banda. There had been agreement at the technical level on the need to apply a new methodology in the course of negotiating the first World Bank structural adjustment loan. Difficulties had arisen in applying the suggested methodology. However, the decision to raise maize prices sharply in 1982 had little to do with methodological issues. It reflected the president's preoccupation with food security against the background of drought experiences. Civil servants' recommendations on the basis of the agreed methodology were ignored.

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[1] ADMARC: Agricultural Development and Marketing Corporation.

Table 1 - Malawi: Gross Commitments, Net Resource Transfers, and Volume of Imports, 1980-1986

Source	1980	1981	1982	1983	1984	1985	1986
	---------- Gross Commitments ---------- (million $)						
World Bank Group	14	115	41	55	99	127	25
IMF	36	58	12	24	38	23	0
Bilateral A	108	105	96	85	75	78	193
Bilateral other	30	7	n.a.	11	n.a.	8	67
Commercial banks	22	33	0	n.a.	3	3	0
Supplier's credits	23	2	1	n.a.	3	2	0
Total (All Sources)	282	403	149	232	297	277	285
	-------- Net Resource Transfers -------- (million $)						
World Bank Group	10	64	-1	31	67	24	72
IMF	34	24	-6	16	8	-6	-24
Bilateral A	96	111	91	82	77	76	90
Bilateral Other	21	0	-8	1	-7	-5	-10
Commercial Banks		2	-2	1	2	2	-42
Supplier's Credit	10	-1	-6	-5	-3	-4	-3
Total (All Sources)	212	193	124	123	58	97	83
	----- Imports of Goods and Services ---- (1980 $ million)						
	411	310	304	310	278	227	202

Source: World Bank data files.

The initial pricing methodology was improved over time and gained acceptance in civil service circles (Kirchner et al. 1985). The methodology was based on a multi-market model consisting of six sets of supply and demand equations (one for each crop and one for fertilizer). It tested the impact of price changes on all crop outputs and fertilizer use, and assessed the impact on the real incomes of smallholders and urban consumers, ADMARC's surplus from crop trading activities, and net foreign exchange earnings from agriculture. Recommendations made by civil servants on this foundation provided the basis for government decisions to some extent. Some people expressed concern, however, that the pursuit of this approach had led to decisions that had kept nominal maize

prices fixed for too long and that this had precipitated a sharp fall in the production of maize. Lele (1988)[1] pointed out, for example, that in 1985, Malawi's smallholder maize producer price was only 50 per cent of Kenya's and 60 per cent of Tanzania's at purchasing power parity exchange rates.

Table 2 - Malawi: ADMARC Producer Prices and Amounts Purchased

	Dark Fired Tobacco	Groundnuts	Cotton	Maize
	ADMARC Producer Prices (tambala per kg)			
1980/81	59	33	25	6.6
1981/82	59	33	23	6.6
1982/83	59	37	29	11.1
1983/84	59	55	38	11.1
1984/85	91	60	42	12.2
1985/86	125	70	46	12.2
1986/87	125	75	50	12.2
	ADMARC Purchases			
1979/80	11.4	31.3	23.1	91.9
1980/81	12.8	19.9	21.7	136.6
1981/82	8.8	30.6	15.1	246.1
1982/83	9.3	30.2	13.4	244.6
1983/84	19.2	9.9	32.1	296.4
1984/85	20.0	18.2	32.7	271.6
1985/86	17.3	53.3	21.8	112.6
1986/87	18.1	44.8	21.4	59.5[a]

[a] In 1987, private purchase of maize was introduced, leading to a dramatic drop in ADMARC maize purchases.

Sources: World Bank data files; Government of Malawi (1987).

3. The Subsidy Policy and its Impact

The attempt to phase out the smallholder fertilizer subsidy of about 25 per cent over three years had a tortuous history. On the donor side it involved the IMF, the World Bank, and the USAID. On the Malawian side, the Treasury was the lead agency, but there was

[1] Lele, Uma. 1988. Structural Adjustment, Agricultural Development and the Poor: Some Lessons from the Malawian Experience. Washington D.C. World Bank.

considerable tension between it and the Ministry of Agriculture. Furthermore, the subsidy removal programme produced massive complaints from members of parliament to the top leadership and led to a significant shift in the government's position. Two jokers in the pack of cards were the drastic deterioration in the transport situation owing to the closing of Mozambican routes, and devaluation, which put great pressure on the kwacha cost of fertilizer sales.

One can first cite some of the key facts pertaining to this policy episode. The interpretations given to these events by various policy actors tend to differ significantly. It is beyond the scope of the present analysis to trace out all the ramifications of these divergent views.

Some key facts closely relate to this policy episode. First, fertilizer prices paid by smallholders doubled between 1980/81 and 1984/85. There was a further increase of 37 per cent for 20:20:0 fertilizer and 23 per cent for CAN fertilizer in 1985/86. Most of these increases were the result of devaluation and rising transport costs. The rate of subsidy remained high at a level of 23 per cent in 1985/86. A decision had been taken not to adhere to the original time table for subsidy withdrawal. U.S. policy conditionality started in 1985 and a new schedule for phasing out the subsidy by 1988/89 was worked out. Second, fertilizer use continued to expand fairly rapidly, although not steadily, throughout this period. It declined somewhat in 1981/82 and once again in 1985/86. However, the following year recorded a new peak 80 per cent above the 1979/80 level. Third, the ratio of fertilizer to maize prices fell from 17.1 in 1979/80 to 11.9 in 1985/86. These ratios were very much higher than in Kenya and other comparable countries (Lele 1987, p. 37). The profitability of maize (except local maize without fertilizer) declined absolutely and even more sharply in relation to margins applicable to groundnuts, tobacco, and cotton. Fourth, the government abandoned the subsidy removal programme even though it meant doing without some conditional finance.

Three conclusions can be drawn from this episode. First, the subsidy removal programme started out mainly as a measure to reduce the budget deficit. The subsidy constituted 6 per cent of the budget deficit in 1984/85. A full scale analysis of the consequences of phasing out the subsidy for fertilizer use, adoption rates for hybrid maize, and maize production was not undertaken at the outset. This was unfortunate. Second, agreement either among various Malawian agencies or among various donors was not unanimous. Positions were adopted and negotiations undertaken

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[1] Lele, Uma 1987, Structural Adjustment, Agricultural Development and the Poor: Some Observations on Malawi. Washington D.C. World Bank (mimeo).

without an appreciation of how the programme would affect various economic objectives or various socio-economic groups. Third, the decision to abandon the subsidy removal programme was precipitated by a crisis caused by a sharp decline in ADMARC maize purchases and the large build-up of stocks. Furthermore, policy makers began to recognize that fertilizer and agricultural credit policies required basic reconsideration to address the special needs of relatively poor smallholders.

The Subsidy Issue in Indonesia*

1. Introduction

Indonesia began subsidizing fertilizer in 1971 to encourage its use as a complement to the new, high-yielding rice varieties that were becoming available. While providing considerable assistance to encouraging farmers to utilize these new HYVs and the associated package of inputs, the subsidy for fertilizer has attracted considerable attention in the light of the increasing budget limitations in Indonesia. The high levels of fertilizer and HYV use, the rapidly changing elasticities and cross elasticities among the major food crops, and the growing intersectoral linkages in the Indonesian economy suggest reasons for re-assessment of the subsidy for fertilizer.

The general objective of the subsidy was directed exclusively toward the expansion of the rice supply in Indonesia; in the initial periods, credit for fertilizer at subsidized prices was available only for rice production (Monre, 1981, p. 128). As late as 1979, the vast share of fertilizer was used for rice. Since 1971, the amount allocated to the subsidy has grown very substantially, coming to overshadow all other expenditures in the agriculture and irrigation sector. While the declining oil revenues have placed all major expenditure categories under pressure, this paper argues that the unusually strong success in meeting the objectives for fertilizer policy in itself has generated the need for fundamentally rethinking the pricing and subsidy policy regarding fertilizer in Indonesia.

2. Subsidy objectives

Rice self-sufficiency was the dominant goal for Indonesian agricultural policy in the New Order government after 1967. One component of the strategy for self-sufficiency was the subsidization of fertilizer. The specific arguments for subsidizing fertilizer in Indonesia were: (a) to encourage the use of fertilizer as part of the improved production practices associated with the new rice varieties, (b) to stabilize the price to farmers by providing a ceiling price on the dominant cash input, and (c) to provide a relatively efficient transfer of resources from government (tax sources) to farmers to foster rural development. This last objective is one component of a broader strategy in Indonesia to develop the rural sector as the principal employment growth source.

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* Adapted from Douglas D. Nedley and Steven R. Tabor: Fertilizer in Indonesian Agriculture: the subsidy Issue: Agricultural Economics, 3 (1989) Elsevier Science Publishers B.V. Amsterdam.

There is an important political content to the Indonesian fertilizer subsidy which influences decisions regarding the allocation of public resources. The Government's decision to provide fertilizer subsidies was motivated by a broader, political desire to promote domestic stability and security. The provision of rice subsidies, in conjunction with the provision of a controlled floor price and maximum urban rice price, has enabled the Government to fulfil the political imperative of providing satisfactory incentives to producers in order to extract greater surpluses of the main staple food while keeping urban prices, as well as the quantities available on the urban markets, at a level affordable to the growing, fixed-income, poor and middle-income earning population. Subsidies on inputs and output price support, together with other forms of rural investment, have been an important means of securing the loyalty of the rural elite (Collier, 1978) to the overall accumulation process fostered by the state (Robison, 1986). In addition, the development of a relatively efficient system of releasing government rice stocks in urban markets when prices rise (Means, 1981), has provided a rice pricing system which has largely assuaged the fears of urban population of rice shortages and consequently has kept the more politically volatile urban constituency relatively pleased with the Government. Keeping the rural elite motivated to produce more rice, and more importantly, producing an adequate surplus for the urban markets, while keeping urban prices stable enough to minimize the risks of deprivation and protest amongst the politically volatile urban fixed-income earners, explains the fairly widespread support for large fertilizer subsidies throughout the military and political arms of the New Order regime.

By any measure, the policy pursued by Indonesia in the period from 1969 to 1986 has been successful. Nitrogen use has increased by 19.7 per cent, phosphate use by 28.7 per cent and potash use by 13.7 per cent per annum over the years 1972 to 1986. For the food crop sector, the percentages are more impressive: 19.2, 31.4 and 32.6 per cent, respectively. The Economist labelled this rate of growth "... the biggest increase in the world".* The greatest uses of fertilizer are for rice and food crops on Java. In 1986, over 60 per cent of fertilizer went to rice, over 80 per cent went to all food crops, and over 80 per cent of all fertilizer was used on Java.

The complementary inputs and practices have grown by equally high rates (Table 1): extension agents grew in number by 20.5 per cent annually, farmer cooperatives grew by 32.6 per cent, fertilizer kiosks increased 19.8 per cent per annum, the number of

* Indonesia Survey. The Economist, 15 August 1987, p. 11. The World Bank has also held up the Indonesian experience as exemplary in the World Development Report, 1986. The World Bank, Washington, D.C.

rural credit banks tripled, and farmer improvement groups increased 11.6 per cent annually. In 1987, high-yielding varieties of rice represented over 95 per cent of the area of rice and over 97 per cent of the production in Indonesia.

The price ratio of rice and fertilizer and its stability have long been regarded as the most critical variables in determining farmers' income and welfare levels in the rural areas generally. However, the changes in the economy and the diversification objective in food crops call into question the single measure of welfare that this variable represents (Hedley, 1987; Tabor et al., 1987). In terms of price stability, the nominal price of fertilizer has increased by 9.1% per cent per year for the period 1974-1987. In real terms, the price of fertilizer has fallen slightly, by 2.53 per cent per year. From 1980 to 1985, the padi (rough rice) to fertilizer price ratio has remained between 1.5 and 1.9. For the rural income support objective, the consistently high profitability of rice, twice as high as any other competing food crop, suggests considerable impact on rural incomes.

Embedded in this success story are the reasons for reviewing the policy. The subsidy cost for fertilizer has burgeoned from virtually nothing in the early years to two-thirds of the agriculture and irrigation sector budget in 1986-87, and about eight times higher than the expenditures made through the Ministry of Agriculture for research, extension and production programmes in food crops, estate crops, fisheries and livestock combined (Table 2). The success in stimulating use of fertilizer makes the policy increasingly expensive. The sharp decline in available governmental revenues forces policy makers to reconsider major spending programmes; since the fertilizer subsidy makes up two-thirds of all spending on the agricultural and irrigation sector in 1986, the fertilizer subsidy is a prime candidate for budgetary savings. An added political concern is that while the economics may suggest lowering or elimination of the subsidy, raising the fertilizer price to farmers as the means to do so is deeply sensitive in the countryside. Finally, the rapid growth in incomes in Indonesia throughout the 1970s has led to considerable change in the income and price elasticities for food and between food and non-food goods. These changes dramatically alter the usefulness of the fertilizer price as a policy instrument in the agricultural sector.

Two basic issues emerge. First, who are the beneficiaries of the fertilizer subsidy, and second, what are the impacts on farmers and food crop production of removing the subsidy.

Table 1 - Changes in infrastructure and input use in Indonesia, 1972-1986

Year	Fertilizer consumption[a]					
	Food crops sector			All Indonesia		
	N	P	K	N	P	K
1972	228	21	2	255	33	39
1976	313	96	3	352	111	26
1979	551	130	18	620	151	84
1983	2310	702	92	2495	739	162
1986	2652	988	302	3169	1131	240

Year	Field extension	Farmers coops	Rural credit banks	Fertiliser Kiosks	Framer groups
1970	1584	n.a.	545	n.a.	39066
1973	3263	2557	2060	1930	62025
1976	6290	3911	2988	7774	82576
1979	11228	4463	3312	12485	126108
1983	14904	6141	3617	18322	206076
1986	31474	7126	3646	20303	225041

[a] Nutrient equivalent, 1000 t.

Sources: BIMAS Crop Reports, Ministry of Agriculture various (annual) reports; and PUSRI, Annual Offtake Report, various issues.

Note: Field extension agents are defined as farm field extension workers (PPL). Rural credit banks refer to village branches only, cooperatives are the KUDs and the farmer groups are the Kelompok Tani involved in rice production.

Table 2 - Fertilizer subsidy budget in relation to aggregate budgets in Indonesia (billion Rp.)

Fiscal year	Routine budget	Development budget	Total agriculture and irrigation sector budget	Fertilizer and pesticide subsidy	Remaining agriculture and irrigation sector budget
1975-76	1,332.6	257.0	257.0	134.5	122.5
1976-77	1,629.8	356.0	356.0	107.3	248.7
1977-78	2,148.9	380.0	380.0	31.8	348.2
1978-79	2,743.7	450.0	450.0	82.6	367.4
1979-80	4,061.8	508.0	508.0	125.0	383.0
1980-81	5,799.9	929.0	929.0	283.6	645.4
1981-82	6,977.6	954.0	954.0	371.4	582.6
1982-83	6,996.3	931.0	931.0	420.1	510.9
1983-84	8,411.8	913.0	913.0	324.2	588.8
1984-85	9,428.9	1699.1	1699.1	731.6	967.5
1985-86	11,951.5	1137.5	1137.5	477.1	660.4
1986-87	13,125.6	8296.0	1105.5	671.5	434.0
1987-88	15,026.5	2756.7	1180.7	203.5	977.2

n.a., not applicable.
Gov. Indonesia, several years.

The effect of a price distortion may affect production and consumption patterns of several commodities simultaneously. Second and third-level multiplier effects can be quite important when analyzing the effects of a major price distortion, such as fertilizer subsidies in Indonesia. In order to evaluate the multiplier effects of subsidy removal, policy analysis tools which take into account all inter-commodity and inter-factor corrections simultaneously need to be utilized. A fully-consistent multi-market econometric model was developed by Douglas D. Hedley and Steven R. Tabor [1] in order to assess the "full" effects of subsidy removal. The model is based on a set of adaptive response equations to model area allocation; a set of profit functions to model factor allocation and productivity and an Almost Ideal Demand

[1] "Fertilizer in Indonesian Agriculture: the subsidy issue" by Douglas D. Hedley and Steven R. Tabor in Agricultural Economics, 3 (1989) 49-68 Elsevier Science Publishers B.V. Amsterdam.

model consumer budget response. The sector model is linked to a three-sector macro-economic model through the [illegible] of value added in the factor and product markets. [illegible] is used to clear the market, at fixed commodity prices, for [illegible] simulation. The model is described in more detail in [illegible] et al. (1988).

[illegible] 1986, Indonesia has progressively reduced the [illegible] subsidy to fertilizer. However, this is more a [illegible] measure in that domestic fertilizer prices have not been increased enough to offset the loss in revenues from the lower [illegible] budgetary subsidy to the fertilizer producers and distributors. The fertilizer industry has been allowed to offset [illegible] by increasing its debt-equity ratio with public-sector banks; hence a rather transparent budgetary subsidy has shifted to become, at least in the near term, more a question of optimal [illegible] debt management than subsidy or expenditure. As the debt [illegible] increases within the fertilizer industry, the removal of the fertilizer subsidy will become more a question of a strategy to reduce debt arrears rather than to remove a direct subsidy. In either case, government price controls merely shift the subsidy burden, rather than eliminate it. The Indonesian approach to subsidy removal illustrates the importance of looking beyond government budget allocation accounts to an economic assessment of price distortion in order to understand the role of subsidies in an agricultural economy.

3. [illegible]t of Subsidy Policy

[illegible] the subsidy began, the level of fertilizer consumption was [illegible] and the technology for rice was equally low. The subsidy appears to have been a powerful tool to induce both the adoption of the new rice technology as well as to provide some transfers of income to the rural poor. Since that time the production surface for rice has shifted outward and upward with substantially greater marginal response to fertilizer than previously (Figure 1). The effect has been to dramatically shift the fertilizer demand outward over the past two decades as a response to governmental spending in agricultural research, extension, irrigation and other infrastructure investment in the sector. Not only has the production function for rice shifted outward, the slope of the function with respect to fertilizer has increased, thereby encouraging the use of the fertilizer in the early adoption years and making the fertilizer demand function relatively more elastic than in earlier periods. The price elasticity of demand for fertilizer has been estimated as three times higher for the modern varieties than for the modern varieties (Pitt, 1983). Since rice farmers are now using high levels of fertilizer and almost exclusively the HYV rices, the demand for fertilizer for rice production is expected to be considerably more elastic than a few years ago. Finally, the production surfaces for other major food crops are beginning to shift upward and outward, adding strength to